CLAIMS

We claim:

1. A buckle and tongue combination for restraining an occupant in a seat, the buckle and tongue combination comprising:

a housing;

a frame located within the housing;

two pawls disposed upon the frame, each pawl having a distal end and a proximal end, each distal end having a release abutment extending from the respective pawl;

a hinge pin disposed at the proximal end of each pawl for pivotally coupling the pawls to the frame;

a tongue adapted to be disposed adjacent the two pawls, the tongue interlockingly engages the pawls;

a biasing member disposed within the housing, the biasing member engages the pawls urging the pawls to a locked position with respect to the adjacent tongue;

a release button slidably secured along the frame, the release button biased in a first or locked position, the release button having at least one inclined abutment surface which engages the release abutments and urges the two pawls towards an unlocked position when the release button is urged toward a second position opposite from the first position, whereby the user is able to release the tongue from the buckle upon depressing the release button toward the second or unlocked position.

2. The buckle and tongue combination of claim 1, wherein each release abutment is a release pin.

3. The buckle and tongue combination of claim 2, wherein the release button is a molded component having two recesses which open outwardly away from the release pins, wherein the inclined abutment surface is a release wall formed in each of the two recesses, the release pins are received by respective button recesses, and the release wall engages the release pins and urges the two pawls towards the unlocked position when the release button is urged toward the second position.

4. The buckle and tongue combination of claim 3, wherein the release wall is spaced apart from the release pins when the pawls are in the locked position, whereby the spaced apart arrangement allows the release button to be easily moved from the initial locked position up to a point where the release wall comes into contact with the respective release pins, at which time increased force is required to advance the release button so as to disengage the pawls from the tongue.

5. The buckle and tongue combination of claim 3, further comprising a tongue separator, and the tongue includes two separate tongues which are adapted to be inserted between the two pawls and on opposite sides of the tongue separator, each pawl has a ledge, and each tongue has a ledge, wherein in the locked position, each pawl ledge engages a respective tongue ledge to secure the respective tongue within the buckle, and the proximal ends of the pawls include a spring retainer, the spring retainers are arranged in opposed spaced apart arrangement, a pawl spring is located between the spring retainers and urges the pawls into the locked position, the frame further includes arcuate shaped grooves which receive and are arranged in the path of the

release pins, the frame further having two deformed tabs which each form a recess to receive a respective hinge pin, the release button is biased towards the first position in part due to the pawl spring and also by first and second release button springs.

6. A frame for buckle and tongue combination for restraining an occupant in a seat, the frame comprising:

a first one-piece frame half and a second one-piece frame half identical to the first frame half, each frame half includes a substantially planar main body portion, the main body portion includes a tongue receiving neck portion having a left side and a right side, one of the sides includes a flange portion extending from the main body portion at a right angle and in a plane parallel to a tongue path, the other side includes a slot extending in a plane parallel to the tongue path, the main body portion includes a left shoulder portion and a right shoulder portion, each shoulder portion includes an arcuate shaped pawl release pin slot, a lower portion of the main body portion includes a left side and a right side, one of the lower portion sides includes a flange portion extending from the main body portion at a right angle and in a plane parallel to a tongue path, the other lower portion side includes a slot extending in a plane parallel to the tongue path, the lower portion also includes a left and right pawl hinge pin recess, each pin recess is formed by a portion of the main body portion deformed and displaced from a plane of the main body portion, the lower portion also includes a belt receiving slot portion, each belt receiving slot portion extends from the main body portion in an offset manner so as to be displaced inwardly of the frame, whereby with the first and second frame portions mated together, the neck flange of each frame half is received by the neck slot of the other frame half, wherein the neck forms a

rectangular tongue receiving opening and the lower portion flange of each frame half is received by the lower portion slot of the other frame half

7. The frame of claim 6, wherein each frame half includes a longitudinal separator slot extending along a centerline of the neck portion, whereby the frame may be used with either a one-piece or two-piece tongue.

8. The frame of claim 7 further comprising a separator formed of a strip of metal with tabs at each end, the separator having sides which are received by the respective separator slot and retained in position by the tabs, whereby the separator can be included for a dual tongue buckle.

9. The frame of claim 6, further comprising two identical pawls, each pawl having a distal end and a proximal end, each distal end having a release pin and each proximal end having a hinge pin, each hinge pin being received in a respective pin recess, and each release pin being received in a respective arcuate shaped pawl release pin slot, each pawl further includes a spring retainer at the proximal end, the spring retainers being aligned in spaced apart relation, a pawl spring includes ends trapped between the spaced apart spring retainers and the pawl spring is further held in place by the two main body portions,

10. The frame of claim 6, wherein the belt receiving slot portions are in contact with one another, and each flange portion which is received by a respective slot, includes a shoulder which abutes against the frame half of the respective slot, whereby the shoulders and the belt receiving slot portions maintain the frame halves in a spaced apart relationship.

11. A buckle and tongue combination for restraining an occupant in a seat, the buckle and tongue combination comprising:

a buckle having a pair of pawls, each pawl having a distal end, the distal ends are biased towards each other towards a closed locked position;

a tongue which is releasably and lockably received by the buckle, the tongue having a first tongue and a second tongue, the first tongue having a non locking pawl spreader, the second portion having a non pawl spreader, pawl lock, whereby the first tongue and the second tongue must both be inserted together so as to both spread the pawls apart and lock the tongue with the buckle.

12. The buckle and tongue combination of claim 11, wherein both the first tongue and second tongue include a distal end and a proximal end, the proximal end of the first tongue includes a slot which extends longitudinally and is open at the proximal end, and the proximal end of the second tongue includes a tab which extends longitudinally and is received by the slot of the first tongue when the first tongue is placed over the second tongue.

13. The buckle and tongue combination of claim 11, wherein the distal ends of the pawls each include a ledge, and the second tongue includes a pair of opposed ledges for locking engagement with the respective pawl ledge.

14. The buckle and tongue combination of claim 13, wherein the ledges of the pawls and tongues includes a reverse cut, whereby a more secure locking engagement is provided.

15. The buckle and tongue combination of claim 13, wherein the second tongue includes lateral edges, and the ledges of the second tongue are formed by a notch in each of the lateral edges.

16. The buckle and tongue combination of claim 11, wherein the second tongue includes a distal end having a substantially flat edge which extends substantially perpendicular to a longitudinal axis of the second tongue.

17. The buckle and tongue combination of claim 11, wherein the second tongue includes a distal end having an edge, the edge includes outer edge portions and a mid section portion, wherein the outer edge portions extend beyond the mid section portion, whereby the distal edge is not adapted for spreading the distal ends of the pawls apart from the locked position.

18. The buckle and tongue combination of claim 13, wherein the first tongue includes lateral edges, the lateral edges each include a clearance notched area so that the ledges of the second tongue remain exposed when the first tongue is placed over the second tongue, and the lateral edges of the first tongue each include a ledge extending from the notch towards the distal end of the first tongue and include a tangent, the tangents extend toward the distal end of the first tongue in a diverging direction from one another.

19. The buckle and tongue combination of claim 18, wherein the ledges of the first portion include a straight edge.

20. The buckle and tongue combination of claim 18, wherein the ledges of the first portion include a curved edge.

21. The buckle and tongue combination of claim 11, wherein the first tongue includes a distal end having a substantially curved.

22. The buckle and tongue combination of claim 11, wherein the first tongue includes a distal end having an edge, the edge includes outer edge portions and a mid section portion, wherein the mid section portion extend beyond the outer edge portions, whereby the distal edge is adapted for spreading the distal ends of the pawls apart from the locked position.

23. The buckle and tongue combination of claim 11, wherein the first and second tongues include a substantially planar main body portion, the main body portion having the distal end and the proximal end, the proximal end each having a depending portion which forms a belt receiving slot.

24. A buckle and tongue combination for restraining an occupant in a seat, the buckle and tongue combination comprising:

a tongue having a distal end and a proximal end;

a housing having an external finished surface and an opening for receiving the distal end of the tongue;

a spring ejector mechanism having a contact area which is engaged by the distal end of the tongue, the contact area includes an external finished surface substantially similar to the external finished surface of the housing, whereby with the tongue removed from the housing, the contact area covers the housing opening and presents a substantially uniform finished surface over the housing and housing opening.

25. The buckle and tongue combination of claim 24, wherein the ejector mechanism includes a spring having first end and a second end, the housing includes a spring abutement, the first end of the spring is retained in place by the spring abutement, and the second end of the spring is secured to the contact area.

26. A buckle and tongue combination for restraining an occupant in a seat, the buckle and tongue combination comprising:

a tongue having a distal end and a proximal end, the tongue having an alignment key;

a housing having an opening for receiving the distal end of the tongue, the housing includes an alignment key adjacent the opening, whereby proper orientation of the tongue with the housing is provided.

27. The buckle and tongue combination of claim 26, wherein the tongue includes two separate tongues, each tongue includes a belt receiving slot, each belt receiving slot includes a molded portion, each molded portion includes a molded alignment key, the housing opening includes two tongue openings, each tongue opening includes an alignment key having an opening shaped similar to the tongue key, the housing further includes first and second springs each having first and second ends, a spring ejector guide for each spring, a spring abutement surface for the first end of each spring, a contact pad for each spring, each contact pad having a bottom surface with a spring retainer for retaining the second end of a respective spring, and having a top surface, the housing further having pawls for releasable locking engagement with the tongues and a release button for releasing the pawls from the tongues, whereby the tongues must have the correct rotational alignment for insertion into the housing, and wherein insertion of the tongues into the housing causes the tongue alignment keys to come into contact with the respective contact pad, and wherein further insertion causes the ejection springs to be compressed and for the pawls to come into locking engagement with the tongues, whereupon the release button may unlock the pawls from the tongues, at which time the tongue are urged outward of the housing as the compressive force of the ejector springs is released and the contact pads urge the alignment keys and thereby tongue outward.

28. The buckle and tongue combination of claim 27, wherein each of the alignment pins includes a semi circle cross section and each alignment key of the tongue opening includes a semi circle cross section opening to receive the respective alignment pins.

29. A molded plastic pin for an interference fit within a stamped opening of a metal plate, the opening having a length and a cylindrical opening area on one side of the metal plate with a diameter d and a conical shaped opening area on the other side of the metal plate with a diameter D, the conical shaped opening area extends from the cylindrical opening area and opens outwardly at the other side of the metal plate, the conical shaped opening area is formed incidental to the stamping process used to form the opening in the metal plate, the molded plastic pin comprising:

a central tubular portion having a substantially constant diameter which provides an interference fit with the opening having a diameter d, the length of the central tubular portion is longer than the length of the opening;

end portions opposite the central tubular portion, the end portions having a diameter which is smaller than the diameter d wherein the end portions freely pass through the opening; and

ribs located about the mid portion, the ribs having a length substantially shorter than the length of the mid portion, the ribs extend in a longitudinal direction but arranged about the perimeter of the mid portion and adjacent each of the end portions, defining a first and second rib area, the diameter defined by each of the first and second rib area is capable of providing an interference fit with the conical shaped opening area of the opening, whereby the pin is supported both at the cylindrical shaped opening area by the interference fit with the and the

conical shaped opening area and regardless of the orientation of the pin with respect to the stamped opening.